Pack off system & Apparatus.

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FIELD OF THE INVENTION

The present invention relates to a system and apparatus for applying and releasing pressure to a pack off apparatus to manage a variable seal around insertion materials for operations and procedures that require insertion materials such as tools or apparatus to be inserted into pipes that are used to tap into and flow natural and manmade resources below ground or water bed. The present invention also relates to effective means of maintaining, measuring, regulating and controlling of pressure and release of pressure for a pack off system and apparatus.

BACKGROUND OF THE INVENTION

In relation to wells in general whether they be oil, gas, water or any other type, there is necessity through the different stages of the life of a well to lower tools of various types down the well to do various jobs during the lifecycle of the well. The process of lowering these tools usually involves having them attached to a length of material anchored and spooled at or near the surface of the well. In some cases the length of material is a part of the tool.

Conditions down a well can vary from well to well and can vary, before, during, and after jobs where tools are lowered to perform various functions. Conditions can involve pressure from water, gas, oil, or any combination of those and other materials acting upwards from below the surface of ground or water bed to atmosphere or low pressure regions of the well. Conditions down hole can have zero pressure where pools or reservoirs of natural resources are extracted through injecting fluid into the well to force the resources to surface.

So when lowering one of these tools down a well there is currently a system that allows the tool to be brought to the necessary depth while maintaining some control over materials such as gasses, liquids, and solids escaping the well. This system also provides a further function in applying pressure around the length of material used to lower the tool or being lowered such that it forms a variable seal that cleans the length of material when it is being spooled up. This cleaning function and pressure control function is achieved through a system known in industries that work with wells as "packing off". This system and apparatus involves various parts, and the term "pack off system" can encompass a number of things involved in the process of maintaining a variable seal around material inserted into pipes tapping into natural or manmade resources.

An example of a current system for providing this variable seal can be seen in the wireline industry, that uses downhole tools in the previously described manner. This system involves 3-4 main parts with 3 of those being the pack off system. These 3 main parts are the "pack off pump", the "pack off hose", and the "pack off head".

This example of a pack off system works as such:

On a wireline job the first part of assembling the pack off system and apparatus involves running the length of material being used to lower and raise the tool, which in this example is wire or cable is run through the axial passage center of the pack off head which is hollow and in this case cylindrical. After the wire or cable is run through a further number of specialized connecting pipe joints it can then be attached to a tool for specialized use downhole. In this example one of the previously mentioned specialized pipe joints called the "stubby" is attached directly to further specialized pipe joints called "lubricator".

The stubby and lubricator joints may be connected to various other specialized pipe joints or apparatus connected to the wellhead. Some of these include specialized pipe joints, such as a flange which is a connecting joint also used for bleeding off pressure, or a B.O.P. which is connected to the well head.

These connecting links, perform functions such as bleed off pressure capabilities, and close off pressure capabilities before a tool is lowered beneath the surface of the well head, and after it is brought above the surface of the well head. These connecting links are important to the description of the invention primarily as parts that the packoff head and/or stubby may be attached to, to maintain regulated pressure prior to, and after commencing downhole jobs.

As to the "pack off system" for this example, further background in its parts are as such; the pack off pump is hand operated with a pump handle, a chamber for housing hydraulic fluid, and a "bleed off" valve for relieving pressure from the pack off head. The pump applies and releases pressure hydraulically to the pack off head via the pack off hose.

The pack off head receives the hydraulic fluid in its annulus chamber, which acts as a piston. When the pack off head is attached to the stubby a spring lodged between the stubby and pack off head applies pressure on the chamber. Also within and between the pack off and stubby head there are three further pieces used to form a variable seal around the wire or cable and against the cylindrical inside walls of the pack off head and/or stubby, allowing for variable escape or prevention of escape of downhole materials such as gasses and liquids under pressure. These three pieces include two brass pieces called the "bushing", and a rubber.

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The rubber is cylindrical for about two thirds of it with a cone shaped nose. The item described as the rubber need not actually be made from rubber but can be made of numerous materials as long as it is pliable enough under conditions to form a pressure seal. The rubber is hollow enough to accept the wire or cable tightly. The two brass pieces known as bushing are slightly more hollow, one being cylindrical and the other as well but the second one having an inverted conical receptacle for receiving the cone shaped nose of the rubber. These pieces have slits along the length of their cylinder and conical outers that allow them to be wrapped around the wire or cable. The bushing can be made from numerous materials but must be harder than the rubber.

This is then done such that they fit within the center of the pack off head and stubby with the top brass piece centered between the spring in the pack off head. When the pack off head and stubby are screwed together the flat base end of the cylindrical inverted conical brass piece sits against a circular ridge inside the stubby, the inverted conical side accepts the conical nose of the rubber, the two pieces together being roughly the length between the interior circular ridge and the outer edge of the top of the stubby. The flat end of the rubber is up against the flat base of the other brass piece, which in turn has its other circular flat base end up against the circular flat bottom of the pack off head hydraulic chamber. The stubby is screwed into the pack off head with the spring lodged between the circular ridge of the top of the stubby and the bottom of the pack off head hydraulic pressure chamber. This is an example of a pack off head mechanism and its parts.

After the pack off head attached to the stubby and lubricator joints is hoisted up and attached to a flange which is attached to the B.O.P. on the well head. The pack off pump is then attached to the pack off hose, which has already been attached to the pack off head. Then the mechanism can be worked according to a wireline operator and assistant/s desired requirements, cleaning the line and forming a variable seal when the rubber is squeezed between the two brass pieces from the pressure applied from the pack off head chamber which receives its pressure from the manual application of the pack off pump, to partially or fully prevent the escape of downhole materials such as gasses, and liquids while lowering and raising the downhole tool to perform a job.

Although this is an effective example of maintaining a variable seal while raising and lowering downhole tools there are a few drawbacks or negatives to this system.

The hydraulic system loses its effectiveness in extreme cold conditions such that they are reduced or negated, as the pack off pump and head can freeze up, which in turn slows down or can halt the procedure being operated, translating to a cost.

Furthermore, pack off pumps have a tendency to breakdown at times and the probability of this is greatly increased during extreme cold conditions.

Also further to that it is not a clean system as it involves the use of petroleum based fluids that as a part of the job escape in small proportions into the environment.

As well the pack off system and apparatus mentioned uses hydraulic fluid for pressurization which costs money and may not always be available on a jobsite when additional amounts are required for a pack off system, and is certainly not available at the jobsite in a virtually unlimited supply.

What's more is that the example given is a system that is not easily or properly gauged, and monitored accurately and precisely.

Further to that the system mentioned only allows for one point of control.

Another draw back is that the above example is manual and does not have automated mechanisms for supplying pressure or monitoring and releasing pressure.

Therefore it is intended that the invention reduce or eliminate some of these problems identified.

SUMMARY OF THE INVENTION

According to the present invention, a pneumatic pack off system and apparatus is disclosed using description/s of the following embodiment/s, wherein;

The pack off system and apparatus uses compressed or pressurized air or gasses as the agent for operating a pack off apparatus that receives the compressed or pressurized air or gasses to operate its mechanisms. When operated the pack off system and apparatus provide a variable and adjustable seal around material inserted into pipes that tap into or are directed to tap into and control the flow of natural or manmade resources below ground or water bed, such as wells and well apparatus.

To drive the pack off system and apparatus a means for supplying compression of the air or gasses is provided, that can be manual or mechanical or automated or any combination thereof. The air, gasses or wind are from a source that is not applied or emanating from below ground or water bed. For example an air compressor or compressed gas tanks/canisters situated near the wellhead could supply pressurized air applied directly to a pack off head to operate its mechanism/s.

The pack off system and apparatus provides the capability for numerous points of control for applying or releasing pressure anywhere within the length of the system and apparatus, such as at the point of compression, along the length of the air hose/s leading to the pack off head, at the console of the personnel operating the downhole procedure, and at the pack off head.

The pack off system and apparatus provides a means for and can or may have gauges to read applied pressure anywhere along the length of the system, but more importantly at the points that are convenient for personnel, and at points where they may have a means of controlling the application or release of pressure.

The pack off system and apparatus provides a means for and can or may have means for controlling the application or release of pressure at points anywhere along the length of the system and its apparatus. This can be done with valves and/or attachments that have capabilities for bleeding off and/or applying air pressure. This could involve knobs or buttons attached to appropriate valves along the air supply line/s at locations convenient for personnel doing operations that allow for incremental supply or release of air pressure, the increments being observed on nearby gauges.

The pack off system and apparatus provides a further mechanism to control the application or release of pressure to be used in conjunction with gauged readings of pressure applied. One such mechanism being a computer and program with parameters for providing instructions for manual or automated application or release of pressure, or any combination thereof. These parameters would depend on the variables and requirements of a given downhole job.

The pack off apparatus that receives the pressurized air to operate its mechanisms pneumatically is responsible for the direct application of the variable seal against the length of material inserted into a well for a downhole job, and in this example/embodiment of the invention it is commonly referred to as the packoff head.

The packoff head apparatus can have various different designs to manage a variable seal. It can have other parts attached to it to perform various functions. It can also be incorporated into other parts or apparatus meant to perform various functions. It can also have parts incorporated into it to perform various different functions. Some features of the packoff head apparatus can include sensory means to detect, analyse and measure emissions. These features can include means for storing emissions data and transmitting that data. Other features can incorporate the built in ability to change between or have simultaneous pneumatic and hydraulic pressure within the same system.

DETAILED DESCRIPTION OF PREFFERED EMBODIMENT

The invention in its two broadest applications are first for pressurized matter escape control and/or as a cleaning function when passing a string or length of material through pipes under pressure from gasses or liquids, and this may also include plasma pressure, or any combination of one or more states of matter such as gasses, liquids, solids or plasma, or secondly passing a string of material/s through pipes that are not under pressure and into any combination of one or more states of matter like oil or water and the invention provides a cleaning function when withdrawing the string of material.

The following descriptions of applications and embodiments are chiefly in the oil and gas sector and the main description of the preferred embodiment is in relation to its use in wireline operations.

The following embodiments are used to describe the invention.

A pack off system operating with many of the same parts as described previously in the background of the invention but with a number of changes.

The process of assembling or "rigging in" the pack off apparatus used for describing the wireline embodiment works much the same as was described in the background of the invention. A pneumatically tooled or molded pack off head would have the wireline run through its axial annulus passage, and then the wireline would be run through one or more lubricator pipe joints.

Before the pack off head is attached to the lubricator, bushing of solid materials and a rubber that could be any composite of pliable materials softer than the bushing would be slid onto the wireline between the pack off head and the stubby attached to the top of the lubricator pipes. The pack off head would then be attached by screwing onto the stubby with the bushing and rubber fitting between the stubby and the pack off head annulus.

A hose used for pumping air would be attached to the pack off head, and at the other end of the lubricator a wireline tool such as a logging device would be attached to the wireline that has been run through the pack off head, a bushing piece, the rubber, a further bushing piece, the stubby, and one or more lubricator joints.

All of these parts mentioned in the previous two paragraphs would then be hoisted to a service rig mast, lowered and attached to a flange, which is further attached to a B.O.P., which is further attached to a well head, which is further attached to a string of pipe reaching a given depth below ground surface or water bed.

The wireline and logging device are encased in the annulus of the lubricator, stubby and pack off head. The pack off hose is then attached to an air compressor and gauged and measured pressure is applied from a point on the pack off hose or compressor directed towards the pack off head where the pack off head is "fully packed off" and the seal is 100%. The shut in valve to the well is then opened to equalize pressure within the

lubricator and stubby annulus. Once pressure is equalized, personnel would bleed off air pressure to the required level to allow for lowering the logging device attached to the wireline.

During and after the logging procedure the pack off head would require pressuring up from time to time to form a seal that is either 100% to shut in the well or a seal that is merely strong enough to clean the wireline and reduce emissions while raising tool with the wireline running through and being squeezed by the rubber.

That was an example of one embodiment of the invention and the following describes various features and elements of the invention as well as several applications and embodiments.

The material used chiefly for pressurizing the pack off head would be gas. The most abundant gasses present are the ones within the atmosphere, and during a wireline job it would be the air around the jobsite, whatever mixture or composition that may be.

There is then need for a mechanism to pressurize this mixture of gasses called air. There are several means to achieve this pressure. There is a manual means where a pump, being hand operated, that may utilize the same principles as a bicycle pump can be used. There could also be compression achieved through a mechanical means such as an air compressor be it running on gas or electric or any other means of generating power to facilitate its operation. Pressure can also be made available through the controlled release and application of compressed gasses housed in tanks or reservoirs, that have been obtained from below ground surface or water bed.

Air pressure would be made available through a system of connected hoses and apparatus made from and including the compression unit through to the pack off head that would be required to be of a type sturdy enough to with stand the high pressure being applied by an air compressor. These would already be present in industry for various levels of compression. So parts like valves and air compression hoses would have those qualities. Connectors from the hose to the compression unit and the hose to the pack off head would be of the snaplock type or any other appropriate type available.

Along the length of the hose or at the compression unit, and/or at the console of the operators cab, there would be a means for reading the air pressure applied. Also at these same locations there would be a means for adjusting the amount of air pressure applied. A simple means for reading air pressure applied would be a gauge reading pounds per square inch, or Kilo Pascal's or any other unit or increment used for measuring or indicating pressure.

The means for reading air pressure or controlling air pressure can be located anywhere along the length of the system or can be located remote of the system by the use of a communications arrangement like satellite or wireless that transmits data between personnel or computers and the pack off system.

One example of the above arrangement is where an instrument means for measuring the amount of pressure applied is attached anywhere along the length of the system to take readings. The instrument would be electronic, powered by a housed battery or may have a connection for generated or battery supplied electricity from a wireline truck or service rig, and possess data processing capabilities that could further extend to storing data, which could be downloaded or transmitted at a required or convenient time for collection, or the data could be transmitted in real time while pressure is adjusted or static. This arrangement could also incorporate the use of an electronic digital display that shows the increments in precise decimal readings.

In relation to controlling the air pressure to the pack off head, this may be done by personnel, or by a further mechanism or a combination of personnel and a further mechanism.

A simple means for adjusting and controlling pressure is with fittings arranged along the length of air pressure lines leading from an air compressor to the pack off head that are operated by personnel, on the ground between a wireline truck and the pack off head on the rig platform.

The above mentioned fittings could include a valve with a two-way button where pulling it up may release pressure by bleeding off air and pushing down the button would open a valve to the air compressor injecting pressurized air into the air hose lines. Another arrangement may involve a knob and valve, which releases incremental amounts of compressed air into the air hose lines, of compressed air into the air hose lines, which then may be monitored on an adjacent air pressure gauge until the desired pressure is achieved. The knob may then be turned fully the other direction once desired pressure is achieved to close of the valve and equalize the pressure. This same knob could have a mechanism for bleeding off, such as pushing it down to lock into a release valve and the knob could then be twisted for incremental release of pressure.

A more sophisticated arrangement can be implemented electronically where data regarding the pressure applied from pressure control &/or measurement points along the length of the system to the pack off head is fed to a computer that has a program to analyze the data and can determine preferred pack off pressure according to parameters within a program. These parameters would need to have several fields provided to which data varying according to the job being performed and other variables such as line tension, emissions, downhole pressure and downhole conditions may be received and processed by computer and program to provide communications for pack off pressure levels. This data entry could be part of a routine for a wireline operator during, prior and after a job, or may involve automated data entry from logging devices downhole or other communications capable devices that read data for the required fields of the previously mentioned computer program.

After analysis the computer and program could then display or transmit instructions according to program parameters provided, for manual adjustment of the pack off pressure or through an electronically automated system that transmits instructions by a communications means like cable, satellite, or wireless to an electronic control device that directs pressure application or release accordingly.

The pack off head that receives the air pressure would then apply pressure on the two brass pieces and rubber located within it. This pressure would then cause the rubber to compress against the wireline materials being inserted into the well and the walls of the pack off heads stubby attachment. The amount of compression thus determining the strength of the seal.

Using the example of the pack off head described in the background of the invention the same basic design may be utilized with a few changes, and various alternatives exist for its design and operation and may not yet be in existence.

The annulus chamber that would normally receive the hydraulic fluid would be receiving pressurized air. This chamber could be built as a self contained hermetically sealed unit with the exception of a valve to receive or release pressurized air. The chamber would move against the resistant pressure of the spring within the pack off head depending on the amount of air pressure received. This chamber could also house an annulus air bag, that when inflated would expand the chamber compressing the brass pieces against the rubber, and when deflated would contract the chamber releasing pressure on the rubber and relaxing the strength of the seal. This seal can vary anywhere from 0 to 100%.

In relation to the above mentioned example, the chamber of the pack off head would need to be tooled or molded appropriately to be used in conjunction with the air bag should have a means for opening and closing so that if the air bag needed replacing it could easily be taken out and replaced. This would require secure and tight means of closing the chamber once a new air bag were inserted. One such opening and closing arrangement that could be tooled or molded for the pack off head could involve the unscrewing of the pressure chamber annulus where the part that screws in and out has one or more O-rings in grooves around the inner circumference near the top of the screw head to prevent contamination of the chamber when screwed together.

The pack off head itself could also be tooled or molded to have a bleed off valve or numerous bleed off and/or pressure access valves for releasing or receiving pressure. This would be an advantage if there were a malfunction with any bleed off valves leading to the pack off head. This could also give the capability for two hoses to be attached to the pack off head for controlling its movements, one for applying pressure and the other for bleeding off pressure.

In relation to the pack off head there are many alternative arrangements that could exist for its operation, and design. Although what is described in this document in relation to the pack off head may involve certain additional features and elements, its primary purpose in relation to this embodiment of the invention is an apparatus that may receive and release compressed air and moves to act in applying pressure to a pliable material forming a variable seal when squeezed around a length or string of material passing through the pliable material for performing an operation below the surface of the well.

The pack off head apparatus could be tooled or molded to be incorporated into other parts or apparatus meant to perform various functions. The pack off head may also be tooled or molded to have other parts or apparatus incorporated into it or attached to it that perform various functions. The pack off head may be capable of receiving various fittings other than air pressure connections that perform or give a means to perform various other functions.

The following description is of some of the further functions or capabilities that may be implemented. The pack off head may contain a sensory means that is capable of identifying emissions. The pack off head may have a means for determining the amount being emitted. The pack off head may have a means for recording, or storing, or transmitting data in regards to emissions.

The pack off head may also be a combination of two or more pack off heads combined or built together for various purposes. One such arrangement could exist for trapping or flowing excess emissions that would normally escape one packoff head. A second packoff head could be screwed onto the first one with a flow valve in between for any excess fluid, which would run to a reservoir. Environmental protection apparatus arrangements that differ in pneumatic pressure application to form a variable seal but are similar to this in resultant operational outcomes are published and in use in the oil and gas industry.

This would be useful for operations such as swabbing, where fluid is run off at the wellhead or at a flange above the wellhead, but occasionally small amounts of fluid do escape out through the top of the lubricator where the packoff head is attached. In this arrangement the second packoff head would act as back up pushing any escaping fluid from the bottom pack off head back down to an outflow valve between the two pack off heads. The same pressurizing apparatus or line could pressurize the dual or multiple pack off head apparatus, or it could have a separate line or pressurizing apparatus for each packoff head.

Another example of using the pneumatic pack off head and system described could include a pack off head that is designed to be interchangeable as a pneumatic pack off head or hydraulically operated. This could be done and applied with the proper design for changing pressurizing agents during operations based on their functionality in relation to environmental conditions. The pack off head could in fact have two heads in one. One for receiving hydraulic pressure, and one for receiving air pressure, and these could function simultaneously or at separate times from each other.

Another arrangement may be one pack off head that has both capabilities and when changing from one capability to the other could include a bleed off valve that is part of the pack off head mold with passage from the inner wall of the pack off head to the atmosphere where hydraulic fluid can be blown out by air pressure applied to a separate molded valve that could be in approximate juxtaposition on the packoff head/s or air can be pushed out of the pack off head/s when hydraulic fluid is pumped into the chamber from a separate attached valve. Another arrangement is a packoff head that has seperate

spaces within its annulus chamber workings, where one space/s only receive hydraulic fluids and the other space/s only receive air at any one given time to drive its operational workings, and changing from hydraulic to pneumatic or pneumatic to hydraulic can be done more swiftly and cleanly by bleeding off one system and pressuring up the other.

These arrangements would give the operator an option of utilizing hydraulic or pneumatic pack off capabilities, and the same control mechanisms mentioned previously in this document can be applied to this dual capacity apparatus, but different instrumentation devices would be required for reading and measuring the separate hydraulic and pneumatic pressure levels.

The invention need not be restricted by industry or application within a particular industry. For example the pack off apparatus and mechanisms mentioned can be applied in various ways.

For example the application of the pneumatic pack off head and system previously described for wireline operations can also be applied for the performance of a swabbing operation run from a service rig.

Another example is in the drilling of or performance of jobs for water wells. Tools or apparatus that perforate or analyze data regarding water wells may be used in the same manner as described for water wells or oil or gas wells, hence the same apparatus for the invention could be applied.

The invention can also be applied in use for petroleum pump jacks where the automated and environmental protection features of the pack off system and apparatus could be in place requiring no immediate personnel, but communications to and/or from the pack off apparatus and personnel remote of the pump jack could be in place for monitoring or for controlling the pack off apparatus remote from it and the pump jack.

The application of the invention can vary in its purpose of use. For example when performing tasks for a service rig or a drilling rig there may be the need for a variable seal to be applied during and around the insertion and withdrawal of pipes and, or apparatus. This could be done for various reasons including preventions of emissions for a clean operation of tasks.

In the example mentioned above the cleaning function could be applied during the withdrawal of pipe from a service rig operation where water is present downhole, and a cleaner way of retrieving pipe may include an annulus bag with a pliable and appropriately shaped rubber at its center for accepting the passage of pipe joins. The bag could be expanded and contracted appropriately by the Driller by foot pedal during the withdrawal of pipe. This would prevent water or other fluids from splashing excessively over the platform and other rig apparatus such as the B.O.P., which in turn increases productivity and provides a cleaner operation.

This could also involve operations at gas processing or petroleum processing and distilling plants where adding additional lines may require the sealing off of the section to be worked on, and additional gasses may be added to a lubricator type apparatus for housing welding and torch cutting apparatus. The gasses such as those created from dry ice or liquid nitrogen could prevent explosion when cutting into and welding onto gas pipes housing gas. This would require a pack off mechanism for insertion of materials and withdrawal of materials and easing and strengthening the seal on these materials when performing the task. This procedure and many others that may not yet be in existence can be performed using the same pack off principles on sets or systems of pipes like pipelines used to transport petroleum or natural gas or their byproducts.

Another example of where the application of the invention could vary is in regards to tapping into methane reserves in landfills. In this example the same drilling and maintenance principles may or may not apply in regards to tapping into a man made resource as opposed to a natural resource which means that a pack off apparatus as described for the invention could be utilized for the performance of various tasks requiring a pack off apparatus.

It will be appreciated by those skilled in the art, that the invention is not restricted in its use to the particular application described, and neither is the present invention restricted in its preferred embodiment with regard to the particular elements and/or features described or depicted herein. It will be appreciated that various modifications can be made without departing from the principles of the invention. For example variations in materials used and the shape, number, and arrangement of various elements may be made, changes and modifications in form and details may be made, as well as implementation of variations, and modifications of the invention in its various aspects, as well as variations in the implementation of the invention such as numerous changes in the details of procedures for accomplishing the same results can be made. Therefore the invention should be understood to include all such variations, modifications and changes within its scope.

BRIEF DESCRIPTIONS OF DRAWINGS

Figure 1: Pneumatic Pack Off System and Apparatus with measurement, control, communications, and automation features being used for a wireline job.

1 Service rig mast

2 Pack off head with dual pneumatic and hydraulic capability

3 Compressed air hose connection to pack off head

4 Pack off head bleed off apparatus/pressurizing agent expulsion apparatus

5 Specialised stubby pipe joint

6 Lubricator pipe joint

7 Specialised flange pipe joint

8 Blow out prevention system

9 Pipes directed to tap into resources

10 Ground surface or water bed surface

11 Compressed air hose directing pressure or releasing pressure from the Pack off head

12 Gauge display mechanism for reading measurement of pressure applied that is communications capable and is sending measurement data to a computer in the operators cab

13 Wireline Personnel

14 Wireline materials leading to and being inserted into or withdrawn from pack off apparatus and system of pipes

15 Communications cable and pack off hose with communications cable leading to the operators cab and computer system

16 Wireline personnel manually applying or releasing pressure to the pack off apparatus.

17 Mechanism for manual or automated application or release of pressure to the pack off apparatus

18 Communications cable to further apparatus/computer that analyses new applied pressure data

19 Communications cable to the operators console and computer system

20 Air compressor

21 Spool of wireline materials leading to and being inserted into or withdrawn from pack off apparatus and system of pipes.

22 Operators console

23 Wireline operator

24 Wireline Computer terminal

25 Laptop attached to wireline computer terminal with software with programmed parameters for analysis and instruction transmission/display for manual or automated control of pressure.

26 Operators Cab

27 Wireline Truck

Figure 2: Pneumatic Pack Off Head operated internally by air bag to move chamber like a piston squeezing rubber between bushing forming a seal against wireline and inner annulus.

1. wireline cable
2. pack off head entry annulus
3. top of pack off head
4. outer pack off head wall
5. inner pack off head chamber annulus
6. nib for bleeding off air pressure
7. bleed off valve and bleed off hose attachment
8. air bag
9. inner pack off head chamber annulus wall
10. spring that exerts pressure upwards on pack off head annulus chamber
11. bushing wrapped around wireline cable between rubber and base of pack off annulus piston chamber
12. rubber wrapped around wireline cable and between two brass bushings
13. spin on screw ring for attachment to stubby
14. bottom bushing wrapped around wireline cablethat lodges against stubby under rubber
15. annulus wall that rubber expands against under compression to form variable seal
16. inner pack off head chamber annulus wall
17. inner pack off head chamber annulus
18. air bag
19. attachment and valve for receiving pressurized air
20. view of air bag on the other side of wireline cable and annulus chamber wall

Figure 3: Dual capability Pneumatic and Hydraulic Pack Off Head operated internally by air bag or downwardly directed hydraulic pressure to move chamber like a piston squeezing rubber between bushing forming a seal against wireline and inner annulus.

1. wireline cable
2. pack off head entry annulus
3. top of pack off head
4. pack off head outer wall
5. side view of pack off head outer wall
6. inside view of outer wall of pack off head
7. nib for hydraulic hose attachment and receiving and releasing hydraulic fluid under pressure
8. hydraulic valve
9. wall of innermost annulus of pack off head through which the wireline passes
10. spring that exerts upward pressure on pack off head piston
11. spin on screw ring for attachment to stubby
12. bottom bushing wrapped around wireline cable that lodges against stubby under rubber
13. rubber wrapped around wireline cable and between two brass bushings
14. bushing wrapped around wireline cable between rubber and base of pack off annulus piston chamber
15. bottom wall of pack off head piston chamber annulus
16. chamber housing air bag
17. air bag
18. connector for air hose
19. air hose valve
20. outer wall of pack off head and inner wall of air bag chamber
21. wall that separates the air bag chamber from the hydraulic pressure chamber

Figure 4: Pneumatic Pack Off Head operated internally by air bag that applies pressure when inflated to a rubber at its center that forms a variable seal against materials passing through it.

1. top of pack off head
2. pack off head entry annulus
3. outer wall of pack off head
4. inside view of innermost annulus wall of pack off where material passes through
5. pack off rubber attached by adhesive or sewn to airbags inner annulus
6. nib for bleeding off air pressure
7. valve that bleed off hoses attach to
8. wall of air bag
9. inside of air bag slightly inflated
10. spin on ring for attachment to stubby
11. valve and connector for receiving air hose and air pressure.
12. annulus chamber that houses air bag